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4. Food produce and preservation.

Process for the manufacturing of a food preservation product combined with a process for the preservation of meat, poultry, fish and other foodstuffs such as eggs, vegetables etc.

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Applier's declaration)

To preserve fish or keep it fresh, it is known for diluted solutions of acetic acid or saline solutions, with or without the addition of sugar mixed with condiments or condiment oils, to be used; furthermore, to preserve or salt meat, it is known for mixtures of diluted acetic acid or of salt with sugar or of glucose, with possible additions of condiments or aromatic oils, such as mustard oil, to be used; the use of ethers of acetic acid ethyl in combination with table salt, sugar or glycerine is equally known for the production of brine (pickling); according to other methods for the preservation of foodstuffs, a saline solution is mixed with milk sugar in apart from a number of other additions. The preservation of food produce treated according to one of the above-mentioned ways, is in part done in the preservation solution, with or without the exclusion of atmospheric air, in part in the presence of carbonic acid of an appropriate strength, and in part without a preservation liquid in a gaseous mixture of carbonic acid and acetic acid. Subsequent to any eventual drying prior to giving heat, in an air current or in normal atmospheric air, the treated produce are exposed to the open air, with or without a protective envelope. However, the physical and chemical properties of the foodstuffs, treated with these known methods, are influenced and modified to such an extent – firstly due to the various amounts of the different elements of the

preservation product, and secondly due to the treatment and prescribed preservation procedure – that the food produce subject to preservation can no longer, with regards to its colour, odour or taste, or its chemical and physical properties, be considered equivalent to fresh produce.

The goal of the present invention is the process for the manufacture of a product to keep foodstuffs fresh, together with a process for the preservation of meat, poultry, fish, and other foodstuffs, such as eggs, fruits, vegetables, etc., as well as beverages and saline solutions, etc., this process could also be applied to rendering more or less fresh meat edible, to destroying cysticercosis (lazaretto), trichinella spiralis, etc. The new product to be used differs from the known processes, if one does not consider its composition and the proportions of its various elements, through its surprising effect of modifying neither the colour, nor the odour, nor the taste of the treated foodstuffs, which it therefore keeps in a state of freshness, while nevertheless actually preserving them in a long term way. For the manufacturing of this new product, that is for the execution of the new foodstuff preservation procedure, milky sugar is used in combination with organic acids and etheric mustard oil; compared to known procedures, which are based on the use of analogous substances, and whose goals is foodstuff preservation, the new product distinguishes itself by the fact that organic acids or etheric combinations of milky sugar, that is glucose or galactose with the acid, are formed simultaneously when heated in the milky sugar dissolved in water acidulated by an organic acid, and this before it is mixed with other elements of the preservation product, through adding appropriate measures of glucose and galactose; the new product also distinguishes itself through the use for the actual preservation of foodstuffs of nothing but sinalbin mustard oil, which distinguishes itself from other mustard oils by its special properties, especially worthy for the goal in mind, while allyl mustard oil is only brought into consideration in the food produce field for preservation purposes, therefore for the creation of a surface protection envelope exempt from bacteria for sterilised objects and to preserve cadavers and keep them fresh, and that on its own or in combination with sinalbin mustard oil.

The new product therefore combines, for the aim of preserving in a state of freshness, the advantage of milky acid, which possesses, through its antiseptic action, the most appropriate quality compared to other sugars, and,

through the breakdown of the milky sugar and the formation of d-glucose and d-galactose, and through the simultaneous formation of organic acids or of etheric combinations of the milky sugar, that is of d-glucose, d-galactose and the utilised organic acid, the possibility that the product can be used appropriately for different types of foodstuffs, etc., as needed, through emphasising more or less, in the product manufacturing process, the formation of glucose and galactose or the formation of organic acids, see etheric combinations, or by eliminating one or the other completely. In this way, for example, through the synthesis of the milky sugar and the formation of d-glucose and d-galactose, the fermentation of milky sugar, to which it is easily subjected, is prevented, as is the butyric fermentation, which naturally follows. As d-glucose and d-galactose are directly capable of fermentation, alcoholic fermentation takes place, with the formed alcohol being oxidised through contact with air to form acetic acid, which increases the preservation effect of the process, especially on the surface of the object to be treated. The formation of etheric combinations of the milky sugar, etc., that is of the d-glucose and the d-galactose, also already increase the antiseptic effect of the product. The breakdown of the milky sugar also has the advantage that, thanks to it, pure glucose is obtained, whereas industry glucose which derives from the manufacturing of starch always contains 40 % of a sort of dextrin (gallisin). Another advantage obtained through the breakdown of the milky sugar lies in the fact that one no longer needs to use milky sugar obtained from milk, as source product to produce d-glucose and d-galactose or etheric combinations of milky sugar, etc., or d-glucose and d-galactose but that the products resulting from the breakdown of milky sugar which products are used in the manufacturing of the preservation product can also be obtained, thanks to melibiose, from beet molasses, which breaks down into d-glucose and d-galactose.

The products resulting from the breakdown do not necessarily contain d-glucose and d-galactose, and the etheric combinations of milky sugar with the above mentioned acids, or even yet milky sugar's corresponding organic acids, but they can also be made up of l-glucose and of l-galactose, as well as by d-l-glucose and d-l-galactose, or by d-glucose and d-galactose, etc., these products being derived from milky sugar, that is from lactobionic acid.

The organic acids appropriate for use in the manufacturing of the preservation

product are the following, depending on the intended use of the product: acetic acid on the one hand and tartaric and lactic acids, glycolic acid, diglycolic acid, citric acid and malic acid on the other.

Among the acids mentioned above, acetic acid is never inodorous, even when very diluted. If the intended use of the product is to make more or less fresh meat fit for consumption, or to destroy cysticercosis, trichinella spiralis, etc., then it helps to use compounds with a higher concentration to obtain a faster effect. This especially refers to the strength of the acid contained in the product, as it will for example dissolve the calcium deposits of the trichinella spiralis, cysticercosis or to dissolve the calcium bodies found inside the cysticercosis. However, by using more or less strong acetic solutions, a disagreeable vinegary odour is released. By letting meat stay longer in such a more concentrated product, the surface of the meat becomes greyish, the acetic acid eventually forms, with the dissolved calcium, calcium acetate, which produces a biting effect that, due to the effect on mucous membranes, must be considered as an undesirable consequence in the food industry.

However, the acids mentioned, other than acetic acid, do not have this disadvantage, and for that reason can more readily be used, in a higher concentration, for the treatment of doubtable meat to render it fit for consumption, as well as to destroy bacteria, etc., whereas acetic acid should only be used for highly diluted solutions. In using the product in a concentrated form, or in using it for another application, the acetic acid is replaced by the acids enumerated above, or by organic acids, which, on the one hand do not have the disadvantages inherent in the use of acetic acid, and on the other hand share with acetic acid the property of forming etheric combinations or acids with milky sugar. These very water soluble acids are, above all inodorous, when compared to acetic acid, and do not change the surface colour of meat, even if added in a stronger concentration to the preservation product, and even when the meat stays for a very long time in the solution; they also combine in part with dissolved calcium to form salts that are difficult to dissolve in water, or completely insoluble, which do not otherwise have a biting effect and therefore do not attack the mucous membranes of the digestive organs, which is of capital importance, especially when trying to render second class meat fit for consumption, or to destroy trichinella spiralis, etc., with the help of the new product.

Thus, for example, the calcium salts of the tartaric acids and of diglycolic acid are insoluble in water; the salts of lactic acids, of glycolic acid, and of malic acid are difficultly soluble in cold water, while the calcium salt forming from citric acid is difficultly soluble in cold water and forms a granular powder precipitate in warmer water. The enumerated acids form organic acids, just as acetic acid does, that are etheric combinations or that are organic acids with milky acid, i.e. glucose and galactose. The actually mentioned organic acids, as well as the organic acids that are produced from them, or the etheric combinations of the milky sugar with them, all have a similar antiseptic effect, which is the known property of acetic acid or of its etheric combinations with milky acid, so that for certain applications, and due to the advantages obtained, it is certainly justifiable to replace acetic acid by other organic acids.

The addition of etheric mustard oil to the mixture of the diluted solution of the utilised acid, and to the breakdown products of milky sugar is done with the aim of completely preventing the fermentation process from taking place, or of intending to keep it within admissible limits. The addition has the added advantage of constituting in and of itself a method of rot prevention. Compared to known processes that use etheric mustard oil, always in combination with other etheric or aromatic oils, such as aromatic essences, the new product is distinguished by the fact that only non-etheric sinalbin oil is used for the immediate preservation, due to its particular properties, and that one obtains seeds from white mustard.

Nothing but this mustard oil is appropriate for the goal in mind as, in addition to its specific antiseptic and antifermentative properties, and contrary to other mustard oils, it has the special advantage of essentially not volatising in the presence of water vapour, that is of not being quite etheric, seeing as at normal temperatures it is inodorous, that it is less biting and caustic in its taste than allyl oil, and seeing as it breaks down already when heated or boiled in such a way that none of the severe taste of sinalbin mustard oil can be tasted in foodstuffs that have been cooked, whereas allyl mustard oil has a pungent smell even when added in small quantities, that it provokes crying, and that its pungency does not weaken even after being boiled. Since sinalbin mustard oil is not very water soluble and because of it does not volatise in the presence of water vapour, the use of mustard flour, of a mustard infusion, or of white mustard seeds is not recommended for the present purpose; it is however

recommended to add sinalbin mustard oil to the mixture in the form of an alcoholic solution or of an emulsion.

The different elements of the new product are exclusively found in substances, which in their use as condiments, etc. for human consumption, are found in almost all types of cuisine.

The new product's content of milky sugar (that is, of its breakdown products), of utilised acid and of sinalbin mustard oil, constitutes such a low percentage of the preservation liquid, that it is not possible to notice a detrimental effect on the colour, odour or taste of the foodstuff treated with this said liquid. The elements help each other in their antiseptic preserving effect, and constitute an economical way of preserving the freshness of all kinds of foodstuffs. Having such a low concentration level, the preservation liquid is completely clear and inodorous, and almost without taste.

In spite of its low concentration, the new product has such a high preservation effect, that it can absolutely not be matched by the elements taken separately, and that even at higher concentration levels, because, taken alone, neither milky sugar, nor sinalbin mustard oil, nor one of the organic acids used for preservation purposes, can reach nor even come close to the effect of the new product.

Another useful property of the new product lies in the fact that it removes neither albumin nor other nutritious substances from nutritious foodstuffs that are preserved in it, not even after a very long time, and that it both stays perfectly limpid and does not lower the value of the foodstuffs.

The manufacturing process of the new product is, for example, the following:

Milky acid is dissolved in one of the acids mentioned above, for example tartaric acid; with this solution d-glucose and d-galactose or two other modifications of milky sugar mentioned above are derived, and simultaneously organic acids of milky sugar combined with tartaric acid are formed, that is tetra-tartaric acid of galactose, tetra-tartaric acid of tri-galactose; this solution formed for the breakdown products of milky sugar acidulated using tartaric acid is then mixed with a low strength solution of

tartaric acid; and then sinalbin mustard oil dissolved in diluted or concentrated alcohol, or contained in an emulsion, is added to the mixture. By using other acids, etheric combinations, or organic acids of milky sugar in combination with the acid chosen for the acidulation, are formed. The proportions must be chosen in such a way that the final preservation product contains in all about 2-3 % of milky sugar's breakdown products, 0.2-0.3 % respectively of the utilised organic acids, that is of tartaric acid, of the lactic acids, of glycolic acid, of diglycolic acid, of citric acid, of malic acid, etc., as well as one part sinalbin mustard oil per 20,000-30,000 parts of the finished product.

The actual proportions of the composition do not need to rigorously and numerically correspond to the numbers given above, but can be adapted to each application and modified in consequence. The percentages of the different added elements mentioned in the given examples can therefore be raised or lowered, and, as well, at the time of the breakdown of the milky sugar and the formation of glucose and galactose, of galactose and gluconic acid, or even of the formation of organic acids, that is of etheric combinations of the milky sugar the organic acid used for acidulation, one of these can be made to predominate, or one of two of these could be left out completely.

The preservation process using the new product is done, for example, by using smaller pieces of meat, thus that this meat alone is placed in the new liquid. If one wishes to preserve larger objects, such as whole carcasses or large pieces of animals, then it is necessary to ensure that the preserving liquid is spread as evenly as possible inside the tissues to be preserved. By using more concentrated solutions for this preservation, the acid can be subsequently diluted, if need be.

There exists a process to spread the liquid etc. in the tissues of a whole animal, where the preserving liquid is introduced at one of the extremities of the cut carotid artery, from which it exits at the other extremity after having gone through the whole body, the animal being simultaneously subject to an external counter-pressure. In this method of preserving of the body, the preserving liquid spreads in the body from the main artery to the narrowest veins, thus filling the entire system of cells. There is also another procedure in which the preserving liquid is injected through the use of injection tubes into different veins and other areas of the treated object, the animal being

simultaneously subject to an external counter-pressure, without their being a special exit for the draining of the preservation liquid. In this case, the excess injected liquid exits through the pores of the body.

This way of spreading the preservation liquid suffices entirely for the normal conservation of meat, in the shape of entire carcasses or sections of these. However, if the new product will simultaneously be used to make meat that is not totally fresh fit for consumption, or to destroy cysticercosis, trichinella spiralis, tubercles, etc., it is recommended, since these parasites or bacillus always prefer to choose specific areas of the body, to go ahead with a local treatment of the areas known to be nests for these parasites, possibly with more concentrated solutions than one would use for the actual preservation process. To this end, it is necessary to modify the two known methods so that, under the influence of an external counter-pressure, the liquid is introduced under a certain constant or oscillating pressure into veins, arteries or other places, using injectors placed inside the animal etc., and that the liquid is made to exit the animal by other arteries, veins or places through the use of special ejectors, by maintaining pressure inside the object using *ad hoc* constriction. During this process, there is the surprising added result that, inside the cellular system, streams are formed going from the injectors to the ejectors that go through the cells themselves, and which cause foreign deposits residing in the tissues to make their way to the ejectors and be expulsed. It is therefore possible to conduct, not only an impregnation of the treated object, but also a simultaneous radical washing of all the cells, or of some of them. The main advantage of this process is that special parts of the animal's body, that can contain parasites such as cysticercosis, trichinella spiralis, etc., can be treated in a special way with chosen products. This modified process can also be used in a similar fashion to treat somewhat doubtful meat and make it fit for consumption, as the process allows for more or less local treatment of selected parts of an animal, etc.

Both for the known procedure and the new procedure, the interior pressure must be equal or slightly superior to the external pressure applied, such as only slight traces of liquid appear on the surface of the object. For the external pressure, one uses either the preserving liquid or water, or even sterilised water. Compared to the known procedures, the new procedure, with its special arrangement of injectors and ejectors in various parts of the object,

has the advantage of ensuring the cleansing of coagulated blood from the cellular system, such blood normally starting decomposition quickly and preventing an irreproachable preservation. The remainders of blood, resulting from an insufficient bleeding, no longer need to take a more or less long path as they do in the first known procedure; nor do they need to escape by the pores of the skin or of the flesh as in the second known procedure; they are instead carried along by the flows of the treatment liquid and brought to the ejectors, a fact that merits special attention when treating meat that has not been bled properly, such as game.

The amounts of pressure to be used for the new procedure must be chosen, as they must also be for the known procedures, are of 5-15 kg or more per square centimetre when using a constant internal pressure, and this depending on the size and age of the slaughtered animal, while the constant external pressure could then be equal or up to 10% lower than the internal pressure, where the higher pressure levels are used for older or larger animals. When working with variable and oscillating internal and external pressures, these must as far as possible be kept at more or less the same levels as each other, while the oscillations of internal and external pressure should go up and down by not more than 10 to 15% of the average level.

The different injectors are fed by a common supply duct, whereas the different ejectors are connected to a common collection duct. The pressure inside the body of the animal, etc., as in the two known procedures, is brought about through the use of a constriction valve in the ejectors' collection duct, whereas the difference between internal and external pressures is controlled by regulators, conveniently arranged in the ducts in which the preservation liquid circulates.

The preservation of small pieces of meat impregnated by the product can be done in the open air for short preservation periods; the object can then remain exposed to normal atmospheric pressure. But when dealing with larger pieces, impregnated with the new product, and when a longer period of preservation is desired, the preservation, to avoid the loss of weight due to drying out of the meat, must already take place in closed chambers or recipients under atmospheric pressure, with an internal atmosphere artificially humidified to an appropriate level by vapours of the preservation liquid or by its pulverisation.

As opposed to the cooling process, the new process prevents any loss of weight and, due to the preserving effect of its vapour or clouds obtained by dispersion, prevents the formation of any mould or mildew on the surface of the treated object, even in spite of undergoing this humid treatment. Instead of air saturated by the vapours mentioned above, it is also possible to use for preservation, in already known ways, ozonised air, nitrogen, carbonic acid, a mixture of nitrogen and carbonic acid, or any other appropriate gas, while humidification and sterilisation of a locale for the preservation of foodstuffs can be created by vapours, etc. of the preservation liquid, in a similar way to that used for the atmospheric preservation in closed chambers to avoid loss of weight.

Since one prevents the fermentation, or if need be the butyric fermentation, of milky sugar by allowing its breakdown, and since there thereby are created directly fermentable products, such as d-glucose and d-galactose, in the breakdown products of milky sugar, only an alcoholic fermentation takes place, unless it is prevented by the addition of an etheric mustard oil to the preservation product, it is therefore of advantage, when trying to keep the object fresh in gases containing no oxygen, such as when preservation takes place in carbonic acid, in nitrogen, or in a mix of nitrogen and carbonic acid, etc., to add ozone to the chambers together with the vapours and pulverised liquids mentioned above, since ozone exerts an oxidising effect on any alcohol that might be formed and transforms it into acetic acid, which is more stable and has greater aseptic properties than alcohol. Due to the high oxidising properties of ozone, adding ozone in this way, together with the vapours of the new preservation liquid, is also accepted procedure when treating objects in spaces filled with ambient air, that is in the presence of free oxygen, precisely since ozone acts more quickly on the formed alcohol, and transforms more rapidly into acetic acid than the free oxygen contained in the ambient air around the objects.

As it only acts on the surface of the object, the liquid for the preservation of the treated object can be reinforced through the addition of evaporated allyl mustard oil, corresponding to the proportion of sinalbin mustard oil, to the water vapour.

Adding allyl mustard oil in this way, in addition to the use of the practically

inodorous sinalbin mustard oil that can be volatised in extremely small quantities in water vapour, can also be appropriate for the treatment of objects to be preserved, thus for preservation itself, when dealing with anatomical preservation, or with the preservation of dead bodies or cadavers and, as well, the addition of allyl mustard oil with the suppression of the allyl mustard oil can be indicated in special cases for the application of the product.

The new product can in addition be used, by choosing an appropriate amount of the different elements, and by modifying their proportions, for the preservation of dry sausages, of eggs, of fruits, of vegetables, etc. as well as for the preservation of brine, and finally to make second quality meat fit for consumption, and in addition, following this line of thinking, to the destruction of cysticercosis, trichinella spiralis, tubercles, etc.

Summary

The invention is about:

1° A process for the manufacturing of a preservation product that will keep meat, poultry, fish, and other produce such as eggs, fruits, vegetables, etc., fresh; that is of a product that will make questionable meat fit for consumption, as well as for the destruction of cysticercosis, trichinella spiralis etc. through the application of organic acids, such as acetic acid, etc., or of tartaric acid, lactic acid, citric acid, etc., one of these acids being used in combination with milky sugar and etheric mustard oil, and characterised by:

a) A solution of these acids is mixed with a non-volatile and inodorous alcoholic solution or emulsion of sinalbin mustard oil, and to this mixture is added the break down products of milky sugar acidulated with the same acid, these breakdown products being different modifications of glucose and galactose, or of galactose and gluconic acid, as well as of organic acids of milky sugar produced by the acid for the acidulation of this sugar, or even by etheric combinations of milky sugar formed by the acid with the sugar, that is of glucose and of galactose, with the possibility that the acids mentioned above can also be replaced by glycolic acid, diglycolic acid, malic acid, etc.

b) The solution of milky sugar is not acidulated before the breakdown with one

of the organic acids mentioned in 1°, in such a way that the breakdown products of milky sugar added to the new product are solely constituted of different modifications of glucose and galactose, or of galactose and gluconic acid, etc., which prevents the formation of organic acids of milky sugar or of etheric combinations of the milky sugar respectively with the organic acid added to this product.

c) The breakdown of milky sugar acidulated by one of the mentioned acids, into the different modifications of glucose and galactose or of galactose and gluconic acid, is suppressed in such a way that the breakdown products added to the new product are constituted solely of organic acids of the milky sugar or of etheric combinations of the milky sugar respectively with the organic acid added to this product.

d) With the aim of preserving foodstuffs, etc., or of preserving dead bodies, cadavers, etc., one adds to the solution of sinalbin mustard oil to be added to the product, a solution of allyl mustard oil.

e) One adds to the product allyl mustard oil alone, with no sinalbin mustard oil.

2° This invention also concerns a process for the preservation of meat, poultry, fish, etc., to make questionable meat fit for consumption, as well as to destroy cysticercosis, trichinella spiralis etc., consisting of placing the objects to be treated in the preservation liquid or to impregnate them following standard methods, and characterised by:

a) The objects are impregnated in one way or another by the preservation liquid.

b) The respective objects are impregnated in one way or another by one of the liquids mentioned above.

c) The preservation liquid is introduced with the help of injectors into some blood vessels or into some parts inside the treated objects, and that this liquid is made to exit through the use of special ejectors from blood vessels or from some parts, while maintaining an appropriate pressure inside the body through the use of constriction valves, etc.

3° A process has also been provided to keep meat fresh etc. under atmospheric pressure in closed chambers or spaces filled in the known manner by air or ozonised air, or by an appropriate gas, such as nitrogen, carbonic acid, or a mix of nitrogen and carbonic acid, and characterised by:

a) A certain degree of humidity is maintained in these areas through the evaporation or pulverisation of the preservation liquid, to prevent a loss in weight of the preserved matter, and sterilising at the same time the above mentioned spaces, with the caveat that one introduces ozone into them at the same time as one proceeds with the evaporation (pulverisation) of the preservation liquid, and this in the cases where those spaces are filled with normal atmospheric air, or with a gas containing no free oxygen, with the aim of immediately and totally transforming into acetic acid any alcohol created following any fermentation that might take place.

b) One also uses a liquid as mentioned in *e)* to keep dead bodies, cadavers, or pieces of them fresh, with the aim of preserving them.

4° A process for the manufacturing of brine for marinating meat, characterised by the fact that through the addition of an appropriate preservation substance, the brine is guaranteed not to decompose or ferment.

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